

TABLE 4-continued

		Comparative example 1	Comparative example 2	Comparative example 3	Comparative example 4
	CaO	Trace	Trace	Trace	Trace
	MgO	Trace	Trace	Trace	Trace
	TiO ₂	Trace	Trace	Trace	Trace
	Fe ₂ O ₃	Trace	Trace	Trace	Trace
	Silica stone	Trace	Trace	Trace	Trace
	Kaolin	Trace	Trace	Trace	Trace
Mixed	Ceramic powder	100	100	100	100
powder	Mixed binder solution	0	40	40	40
Apparent	porosity (%)	0	35	35	0.1
Surface	Treatment	Not applied	Applied	Applied	Applied
treatment	Drying time (hr)	—	2	2	2
Mixed	Compound I	—	—	39	39
Solution	Compound II	—	—	15	15
	Compound III	—	—	—	—
	NPG	—	—	30	30
	Compound IV	—	—	16	16
	MMA	—	—	—	—
	Compound V	—	—	—	—
	Azo-catalyst M	—	—	0.5	—
	B.P.O	—	—	—	0.5
Impregnating	condition	—	—	Poor	Poor
Physical	Bending strength (MPa)	72	11	46	70
properties	Modulus of bending elasticity (MPa)	40520	11350	15940	37000
	Impact strength	—	0.1	2.1	—
	Wear (μm)	0	—	0.3	0.2
Change in	Coloring resistance	3	1	1	2
color tone	Color fastness	3	1	1	2

Impact strength: unit (kgf · cm/cm²2)

According to the present invention, there is provided a dental material which can keep mechanical strength such as wear resistance and bending strength, color fastness, coloring resistance and aesthetic merit for a long period of time, because of the possibility of achieving a high filling ratio of inorganic materials by impregnating the communicating holes of the porous ceramics with resin, and is excellent in modulus of bending elasticity and impact strength, because of the alleviation of stress in the ceramics, and provided a dental material suitable for a CAD/CAM system.

According to the present invention, furthermore, it is possible to set mechanical strength such as wear resistance and bending strength, color fastness, coloring resistance, modulus of bending elasticity, impact strength and other properties to various levels by changing the raw material for ceramics, filling ratio and/or the kind of resin. It is therefore possible to provide easily and at a low cost a dental material having properties required by an artificial tooth, an inlay, an onlay, a crown and a crown bridge, or a block for CAD/CAM.

It is needless to mention that the present invention is not limited by the foregoing examples.

What is claimed is:

1. A dental material which comprises a porous ceramics block impregnated with a resin, said material being produced by a process which comprises:

- molding into a prescribed shape a mixture comprising a ceramics powder having an average particle size within the range of from 3.0 to 50 μm and including a network-forming oxide, an intermediate oxide, a network-modifying oxide, and a binder,
- firing the molded mixture to produce a porous ceramics block having communicating holes,
- carrying out a coupling treatment on the surface of the communicating holes of said porous ceramics block by allowing at least one coupling agent selected from the

group consisting of a silane coupling agent, a titanate coupling agent and a zircoaluminate coupling agent to penetrate the surface, in the presence of an ultrasonic wave and/or in a vacuum; and

(d) allowing a monomer and/or an oligomer with at least an ethylenic double bond to penetrate into the communicating holes of the thus treated porous ceramics block in the presence of an ultrasonic wave and/or in a vacuum for subsequent polymerization therein.

2. A dental material according to claim 1, wherein the ceramics powder comprises the aluminosilicate combination K₂O—Al₂O₃—SiO₂ with SiO₂ constituting 40–80 weight %, K₂O 1–30 weight % and Al₂O₃ 5–30 weight % of said combination.

3. A dental material according to claim 1, wherein the ceramics powder comprises the aluminosilicate combination K₂O—Na₂O—Al₂O₃—SiO₂ with SiO₂ constituting 40–80 weight %, K₂O 1–30 weight %, Na₂O 1–10 weight % and Al₂O₃ 5–30 weight % of said combination.

4. A dental material according to claim 1, wherein the ceramics powder comprises the borosilicate combination Na₂O—B₂O₃—SiO₂ with SiO₂ constituting 60–95 weight %, Na₂O 0.1–10 weight % and B₂O₃ 1–30 weight % of said combination.

5. A dental material according to claim 1, wherein the ceramics powder comprises the aluminoborosilicate combination Na₂O—Al₂O₃—B₂O₃—SiO₂ with SiO₂ constituting 60–90 weight %, Na₂O 0.1–15 weight %, Al₂O₃ 1–25 weight % and B₂O₃ 1–20 weight % of said combination.

6. A dental material according to claim 1 wherein said porous ceramics block has an apparent porosity within a range of from 0.5 to 70%.

7. A dental material according to claim 2, wherein said porous ceramics block has an apparent porosity within a range of from 0.5 to 70%.

8. A dental material according to claim 3 wherein said porous ceramics block has an apparent porosity within a range of from 0.5 to 70%.